Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183
	)	

REPLY COMMENTS OF ALTEROS, INC.

Alteros, Inc. ("Alteros")[1] respectfully submits these reply comments in the above-captioned Federal Communications Commission ("FCC" or "Commission") *Notice of Proposed Rulemaking* soliciting feedback on proposed rules that would permit unlicensed use in portions of the 1200 megahertz of spectrum in the 5.925-7.125 GHz ("6 GHz") band.[2] The comment record is replete with extensive industry opposition to the Commission's proposed 6 GHz band framework with concerns that new unlicensed operations will disrupt and interfere with incumbent operations, which have no reasonable alternative to the 6 GHz band. In its aim to bringing additional use cases to the 6 GHz band, the Commission should take a more measured and balanced approach that protects rather than undermines the significant value and public interest benefits of all 6 GHz incumbents.

[1] Alteros, an Audio-Technica company, was formed in 2016 and is dedicated to the research, development, and sales of innovative technology products with a special focus on the evolving RF landscape and to creating high-end wireless solutions for live audio production, broadcast studios, sports events, and theater applications in the ever shrinking frequency spectrum. Alteros products capitalize on Audio-Technica's extensive research in ultra-wideband and RF technology and innovative digital solutions to solve the most demanding technical problems.

[2] *Unlicensed Use of the 6 GHz Band, Expanding Flexible Use in Mid-Band Spectrum between 3.7 and 24 GHz*, ET Docket No. 18-295, GN Docket No. 17-183, Notice of Proposed Rulemaking, FCC 18-147 (rel. October 24, 2018) ("NPRM").

I. The Comment Record Supports Reevaluating the Proposed 6 GHz Unlicensed Framework and Adopting a Balanced Approach that Protects Incumbent Operations.

a. Operations Under the Current Proposed Unlicensed Framework Would Harm Incumbent Operations and the Public Interest.

Commenters spanning many industries—including municipalities, utilities, transportation companies, broadcasting interests, telecommunications providers, and equipment manufacturers, among others—have come forward to apprise the Commission of just how damaging unlicensed operations pursuant the Commission's proposed rules would be if adopted as-is.[3] This 6 GHz framework, proposed at the behest of a number of prominent Internet companies ("RLAN proponents"), significantly overreaches with respect to the amount of spectrum needed and permissible operational limits.

Alteros agrees with the UWB Alliance that there are "serious concerns that operation under the proposed rules may cause more interference than anticipated with consumer, commercial, medical, and scientific applications in the 6 GHz spectrum."[4] Indeed, UWB devices in the 6 GHz band support a wide and growing variety of critical and commercially vibrant applications, including health monitoring, automotive ranging systems, Internet of Things,

[3] Alteros noted in its comments that, among other things, the NPRM's proposed EIRP of -27 dBm/MHz is higher than the mean ultra-wide band ("UWB") transmit power, making coexistence impossible across all bands, which is especially untenable given that wireless microphones were required to maintain an OOBE of -90dB in order not to prevent interference with LTE, even though there are far fewer wireless microphones in the market and they operate at a far lower power than WiFi devices. *See also* Comments of APCO; Comments of AT&T; Comments of Toyota; Comments of Boeing; Comments of the National Academy of Sciences; Comments of Decawave; Comments of the Fixed Wireless Communications Coalition; Comments of the UWB Alliance; Comments of the Association of American Railroads; Comments of CTIA; Comments of GCI; Comments of Verizon; Comments of Globalstar; Comments of Intelsat and SES; Comments of iRobot; Comments of the National Association of Broadcasters ("NAB"); Comments of the Society of Broadcast Engineers ("SBE"); Comments of Novelda; Comments of NXP; Comments of Sirius XM Radio; Comments of Teradek; Comments of Volkswagen; Comments of Zebra Technologies, among others.

[4] Comments of UWB Alliance at §1.

industrial asset tracking, sports tracking, as well as wireless professional audio such as Alteros equipment. NXP, described as the largest automotive semiconductor supplier has been developing UWB real-time location system technology, specifically notes that the FCC's proposed 6 GHz framework and proposed maximum EIRP power spectral density limits present "a very high risk of interference between the projected WiFi deployment in this band and the new UWB secure ranging applications" such that a nearby WiFi transmission would create "such a high disturbance on UWB secure receivers that in effect no reception at all is possible."[5] These and other unlicensed uses would be jeopardized if the Commission were to adopt this framework without significant changes.

Alteros disagrees with the Wi-Fi Alliance's claim that UWB and U-NII operations can coexist in the 6 GHz band without additional rules because "much of the interference potential will be confined to particular locations under the control of a single entity that can manage interference itself."[6] One has only to walk outside in any urban or suburban area of the country while observing received WiFi signals. In most locations as many as 4-5 very strong WiFi signals emanating from within indoor, or supposed "confined particular locations," exist outside in the ambient RF environment. WiFi is a 1990's technology which is not defined by "confined and particular" locations. However, this is exactly how UWB devices operate. UWB operations, and wireless microphone operations in particular, can be situated in a variety of sites based on customer demand, with excellent density of use. The FCC's original Part 15 rules for this spectrum did indeed promote the development of devices which can meet the high user density requirements which WiFi proponents now propose, but which will actually result in less performance for all. In densely populated areas where WiFi sites may have close proximity to

[5] Comments of NXB USA, Inc. at 2-3.
[6] Comments of Wi-Fi Alliance at 39.

commercial or residential areas or roads, a UWB operator would have no ability whatsoever to manage interference with any nearby or even mobile access points. Though UWB devices authorized under Part 15 operate on a "sufferance" basis, they were never intended nor designed to suffer interference from a brand new class of unlicensed devices operating pursuant to uncharacteristically high power levels. The introduction of a new class of unlicensed devices in this spectrum would have the effect of giving those new devices unofficial preferential access – basically "licensed" across the spectrum, because such devices will either render current users inoperable or severely impaired.

There are methods proposed to overcome this preferential or artificially licensed treatment. As one method, Alteros would welcome the opportunity for existing licensed operators to manage interference at their sites by way of an FCC-approved beacon fence in conjunction with an automated frequency coordination ("AFC") system consistent with various comments of record.[7]

Moreover, the comment record demonstrates that licensed users are similarly concerned that the proposed framework may imperil licensed incumbent operations. Numerous power and utility companies including a group comprising the Critical Infrastructure Coalition, inform the Commission that its 6 GHz proposal does not include sufficient protection to their incumbent microwave networks that are essential to ongoing operation and promote safety.[8] The Association of Public-Safety Communications Officials-International, Inc. (APCO) expresses concern that expanding unlicensed use in the 6 GHz band will cause harmful interference to

[7] Comments of Alteros at 13-15; Comments of the UWB Alliance at §§2 & 4; Comments of the NAB at 18; Comments of SBE at ¶13; Comments of Broadcom at 4 and 45; Comments of Hewlett Packard Enterprise at 26.
[8] Comments of the Critical Infrastructure Coalition at 3-6.

public safety operations, which APCO notes may put safety of life and property at risk.[9] APCO further indicates that the FCC "must substantially revise its proposal and ensure effective mechanisms are in place to mitigate potential interference and rapidly resolve any interference should it occur." AT&T expresses doubt as to whether new unlicensed broadband uses could harmlessly coexist with critical 6 GHz licensed uses, including the microwave operations that support public safety, utility operations, wireless backhaul and other vital services.[10] The record is unequivocal as to the insufficiency of the Commission's proposed 6 GHz framework with respect to incumbents and the public interest benefits their services provide.

b. If Faced With Interference Threats, Many Incumbents Have No Reasonable Alternative.

Even if 6 GHz incumbents were willing to vacate in order to accommodate expanded unlicensed broadband use throughout the entire 6 GHz band, the comment record shows that incumbents have no reasonable spectrum alternative. Alteros/Audio-Technica already has migrated twice from the TV white space bands at 700 and 600 MHz, and finally at the Commission's express encouragement re-established and innovated new spectrally efficient equipment utilizing UWB in the 6 GHz spectrum.[11] There is nowhere else to go. Operation of continuous, high-quality real-time signals is not available in any spectrum other than the currently used shrinking spectrum for wireless microphones. Alteros is not alone in this regard. The UWB Alliance notes that multiple vendors already developed low-cost UWB system-on-a-chip solutions enabling high growth and massive interest for uses where there are no comparable

[9] Comments of APCO at 2.
[10] Comments of AT&T at 4.
[11] Promoting Spectrum Access for Wireless Microphone Operations, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, Report and Order, FCC 15-100, ¶136 (rel. August 11, 2015) ("While we did not propose, nor are we adopting any changes to [the Commission's UWB] rules, we do encourage further developments that can enable various wireless microphone applications to meet particular consumers' needs").

alternative solutions.[12] The Fixed Wireless Communications Coalition ("FWCC")—a coalition of companies, associations, and individuals actively involved in the fixed services (FS), namely terrestrial fixed microwave communications—notes that other FS bands are above 10 GHz, where rain fade limits the useful range, and so the 6 GHz bands are the only remaining option for long links. The Critical Infrastructure Coalition indicates that the 6 GHz long-haul communications systems used its members are deployed across state lines and across large swaths of the country thanks to band's propagation characteristics.[13] If faced with the threat of unlicensed user interference, the Coalition notes that its members "would have no viable alternative to their existing 6 GHz networks."[14] The record is clear that the Commission's proposed rules, if adopted, could constructively displace incumbent operations.

II. Any New 6 GHz Framework Should Be Technology Agnostic and Properly Balanced Through Reasonable Limits and Controls.

The Commission should disregard comments on the record that the entire 1200 megahertz of the 6 GHz band should be opened up for new unlicensed broadband use.[15] These claims are exaggerated and unfounded, and would simply promote spectral inefficiency throughout the 6 GHz RF environment. The Commission also should not use the U-NII-3 (i.e., 5.8 GHz) technical rules as a blueprint for 6 GHz because these bands are inapposite.[16] Whereas 5.8 GHz was underutilized and considered a "garbage band" along with 900 MHz and 2.4 GHz,[17]

[12] Comments of UWB Alliance at §3.4.
[13] Comments of the Critical Infrastructure Coalition at 9.
[14] *Id*.
[15] See, e.g., Comments of Cisco Systems, Inc. at 9; Comments of Broadcom at 5-7; and Comments of Qualcomm at 6-8.
[16] Comments of Broadcom at 1.
[17] *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, First Report and Order, FCC 14-30 (rel. April 1, 2014), Statement of Commissioner Michael O'Rielly.

the 6 GHz band is already densely occupied and being highly leveraged through a variety of efficient, innovative and valuable uses.

The UWB Alliance correctly observes that to fully realize the value of spectrum, its rules "must enable a diverse set of technologies to be developed to address an ever growing diversity in users and user needs" and that "[n]o single technology is ideal for all needs and effective sharing of spectrum among different technologies suited to different uses is essential to achieving maximum value."[18] In their current form, the proposed 6 GHz rules stack the deck against incumbent operations and the millions of customers that rely on their services in favor of more Wi-Fi. Alteros also agrees with CTIA, which observes that "the success of unlicensed services is directly related to the technology-neutral approach the Commission follows in its Part 15 rules"[19] whereby the Commission adopts technical limits to prevent harmful interference to licensed users but also maintains a policy of technology neutrality by not adopting restrictions that favor one unlicensed technology over another. Here, however, the Commission stands to depart from this technology neutral policy by foisting new unlicensed use throughout the entire 6 GHz band at indefensibly high power levels where licensed and unlicensed operations already coexist and thrive.

The Commission must heed the chorus of opposition to the proposed 6 GHz framework and consider modifying the framework consistent with proposals raised in the comment record. These include (1) allowing new unlicensed broadband authorizations only in the 5.925 – 6.1 GHz portion of the 6 GHz band with an out-of-band emissions ("OOBE") limit of -61 dBm/MHz and (2) restricting the duty cycle of each 6 GHz transmitter to 0.5% over a period of 1 second, and specifying significantly reduced power levels. In either case, the Commission also should adopt

[18] Comments of UWB Alliance at §1.
[19] Comments of CTIA at 21.

a central AFC system along with a registered beacon fence mechanism to provide incumbents with an ensured detect-and-avoid capability.[20]

Indeed, RLAN proponents such as Hewlett Packard Enterprise (HPE) and Broadcom have also considered scenarios where they believe an AFC and a geofencing mechanism would be appropriate, such as mobile RLAN (e.g., devices within private property with controlled access such military bases, railyards and container terminals, oil fields, refineries, manufacturing plants, airfields, mines, quarries, power plants, and other industrial facilities).[21] According to HPE, a simple geofence "would allow an AFC to provide available channels for the entire facility and RLAN devices in motion within the facility need never approach a recheck boundary."[22] According to Broadcom, "[t]he AFC can ensure that portable [access points] operate only in allowed frequencies through methods such as geofencing. Using geofencing, an AFC could determine allowed frequencies in a defined operating area. When a user leaves that area, the device would stop operating until the AFC provides new allowable frequencies for operations."[23] By additionally utilizing a signal-based (rather than simply GPS or location determined) beacon fence method to prevent transmission in mission-critical areas, the level of safety and security required by the critical operations which already operate in the 6 GHz spectrum will be better protected.

III. RLAN Proponents Should Carry the Burden to Demonstrate How They Would Not Cause Harmful Interference to Incumbents

Alteros agrees with AT&T that the Commission has chosen to proceed with a rulemaking

[20] Comments of Alteros at 10-15; Comments of the UWB Alliance at §§2, 4; Comments of the NAB at 18; Comments of SBE at ¶13.
[21] Comments of HPE at 26.
[22] *Id*.
[23] Comments of Broadcom at 45.

proceeding "with disconcertingly little technical justification."[24] Alteros further agrees with AT&T that those seeking to introduce potentially disruptive, unlicensed uses into the 6 GHz band should shoulder the burden of demonstrating, by clear and convincing evidence, that the proposed uses would not cause harmful interference.[25] Alteros similarly agrees with CTIA that the costs or disadvantages of protecting incumbent services should be considered as a prerequisite for new unlicensed operations in the 6 GHz band.[26]

IV. The Commission Should Additionally Explore Mechanisms to Protect UWB Operations and Investments, Particularly If the FCC Were to Repurpose a Portion of the 6 GHz Band for New Licensed Services.

Alteros agrees with Boeing that the NPRM provides little attention to ensuring the continued viability of Part 15 UWB devices and that additional investigation is warranted, including an examination of the substantial use of unlicensed frequencies and Wi-Fi connectivity in industrial settings for automation, worker safety, operational coordination, shipping and receiving, and security, among other things.[27] Alteros further agrees that, though Part 15 UWB systems have secondary status in the 6 GHz band, "the Commission should undertake efforts to ensure that the substantial investments and individuals have made in UWB systems are not forfeit by the wide scale introduction of Wi-Fi type devices in this spectrum."[28] Should the Commission consider including an exclusive use, flexible rights use licensed category for 6 GHz as specifically proposed by CTIA[29] and suggested by Verizon,[30] then the 6 GHz band may generate significant revenue through the competitive bidding process. To the extent UWB and

[24] Comments of AT&T at 16.
[25] Comments of AT&T at 4.
[26] Comments of CTIA at 17.
[27] Comments of Boeing at 2-3.
[28] Comments of Boeing at 6.
[29] Comments of CTIA at 7-13.
[30] Comments of Verizon at 12-14.

other unlicensed operators may face being constructively or actively displaced from the band, the Commission should consider adopting rules and a mechanism for making these entities whole.

V. CONCLUSION

The comment record plainly demonstrates that the Commission's proposed 6 GHz framework is ill-suited to protect the densely-packed occupants of the band. In order to allow expanded unlicensed broadband uses in the band, the Commission must limit the amount of spectrum allocated for expanded unlicensed broadband use to the amount which was determined to be necessary by Congress. The commission also must adopt stricter protection requirements and a comprehensive central AFC with additional detect-and-avoid capability. Otherwise, the Commission will effectively displace incumbents to the detriment of the public interest and welfare of customers who rely on those services.

Respectfully submitted,

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